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~~Patent claims~~

1. A method for switching a plurality of packet-oriented signals, in particular for switching and routing in local area networks based on the Ethernet standard,

a) in which a respective signal ( $S_{11}$  to  $S_{nN}$ ) can be supplied to a plurality (N) of port units (3), which each have a predetermined number (n) of ports (7), at one port, a plurality of ports or all the ports, and

b) in which a signal ( $S_{11}$  to  $S_{nN}$ ) is connected from a port (7) on a port unit (3) to a port (7) on another port unit (3) by means of a central switching unit (5) coupled to the port units, with signal transmission between the port units (7) and the central switching unit (5), and vice versa, being carried out in steps by the transmission of data blocks,

c) each port unit (3) ascertaining the address information item for each data packet supplied to one of its ports (7) and using this address information item to determine the port unit (3) to which the packet needs to be transmitted, and each port unit (3) storing the data packet as a whole, or segmented into a plurality of cells, in a buffer memory (9) associated with said port unit,

d) each port unit (3) compiling, at predetermined intervals of time, availability information (CRreq) which indicates to which of the other port units (3) at least one data packet or cell needs to be transmitted,

e) the port units (3) transmitting this availability information (CRreq) to the central switching unit (5),  
f) the central switching unit (5) evaluating the availability information (CRreq) and using a prescribed specification to  
5 ascertain authorization information (CRgnt) which indicates from which port units (3) (transmitting port units) a respective data packet or cell can be transmitted to which other port unit (3) (receiving port units) in the next step or in a particular one of the next steps without blocking  
10 occurring,  
g) the central switching unit (5) transmitting the authorization information (CRgnt) at least to the relevant transmitting port units (3),  
h) the transmitting port units (3) transmitting the particular  
15 released data packets or cells to the central switching unit (5), and the central switching unit (5) connecting the necessary paths between the transmitting port units (3) and the receiving port units (3) and transmitting the data packets or cells to the respective receiving port units (3) via the  
20 connected paths, and  
i) the receiving port units (3) evaluating the address information in the received data packets or cells and assigning the data packets or cells to the relevant ports (7), if necessary recombining the cells received in a plurality of  
25 steps into data packets and outputting the data packets via the relevant ports (7).

2. The method as claimed in claim 1, in which the availability and authorization information (CRreq, CRgnt) and the data packets or cells are transmitted synchronously at  
5 predetermined intervals of time.

3. The method as claimed in claim 1 or 2, in which the availability information is provided in the header of a packet or cell being transmitted by the relevant port unit (3) to the  
10 central switching unit (5).

4. The method as claimed in claim 3, in which the availability information (CRreq) comprises a number of bits which corresponds to the actual or maximum possible number of port  
15 units (3) which are connected or can be connected to the central switching unit (5), the position of a bit within the number of bits indicating the port unit to which a packet or cell is available for transmission, and one binary state of the bits signifying the presence of a data packet or cell to  
20 be transmitted, and the other binary state signifying the absence.

5. The method as claimed in one of the preceding claims, in which the authorization information (CRreq) is provided in the  
25 header of a packet or cell being transmitted from the central switching unit (5) to the relevant port unit (3).

6. The method as claimed in claim 5, in which the authorization information (CRgnt) comprises a number of bits containing a coded designation for that port unit (3) to which transmission of a data packet or cell is enabled from that port unit (3) to which this authorization information (CRgnt) is transmitted.

7. The method as claimed in one of the preceding claims, in which the header of a packet or cell indicates the port unit (3) and the port (7) on the port unit (3) to which the packet or cell needs to be transmitted.

8. An apparatus for carrying out the method as claimed in one of the preceding claims,  
a) having a plurality of port units (3) which are connected to a central switching unit (5),  
b) the port units (3) and the central switching unit (5) each having a control unit which is designed for carrying out the method steps as claimed in one of the preceding claims.

9. The apparatus as claimed in claim 8, in which the central switching unit (5) has a collision resolution unit which uses a prescribed specification to create the fairest possible authorization information for the case in which a plurality of port units (3) at the same time contain at least one data

packet or cell available for transmission to the same other port unit (3).

10. The apparatus as claimed in claim 9, in which the collision resolution unit is designed so as to be integrated with the central switching unit (5).

11. The apparatus as claimed in one of claims 8 to 10, in which the control units in the port units (3) each have an interface unit (Port IF) for coupling the port units (3) to the central switching unit (5), and a protocol unit for carrying out the control tasks internal to the port unit.

12. The apparatus as claimed in claim 11, in which the protocol unit transmits to the interface unit (Port IF) the respective information item regarding whether no data packets or cells, a single data packet or cell or at least two data packets or cells are available for transmission for the other port units (3), so that, once an authorization information item (CRgnt) has been received for the respective port unit (3), the interface unit (Port IF) can use this information to ascertain the availability information for the next step or for a particular one of the next steps without further communication with the protocol unit.

13. The apparatus as claimed in one of the preceding claims,  
in which the interface unit (Port IF) transmits the next  
availability information (CRreq), ascertained after receipt of  
the authorization information (CRgnt), to the central  
5 switching unit (5) immediately with the next data packet or  
the next cell.

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